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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/570,907	03/06/2006	Jae Chul Yong	24341-11349	1642

758 7590 05/04/2007

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EXAMINER	
ANDERSON, GUY G	

ART UNIT	PAPER NUMBER
2883	

MAIL DATE	DELIVERY MODE
05/04/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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Office Action Summary	Application No.	Applicant(s)	
	10/570,907	YONG ET AL.	
	Examiner	Art Unit	
	Guy G. Anderson	2883	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 March 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *06 March 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *3/6/2006 & 1/17/2007*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1.1 The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1.2 **Claim 1 is rejected** under 35 U.S.C. 103(a) as being unpatentable over US-6097487 to Kringlebotn et al. in view of Non Patent Literature publication titled "Interrogation of Fiber Grating Sensor arrays with a Wavelength-Swept Fiber Laser" by Yun et al., herein after Yun.

Regarding claim 1, Kringlebotn discloses an optical wavelength measurement device comprising/wherein:

1a) a wavelength tunable laser including a wavelength tunable filter for outputting a tunable wavelength light; a first coupler for receiving the light outputted from the wavelength tunable laser and for splitting the light into two directions; a reference wavelength generating unit for receiving one of lights split by the first coupler, for generating reference wavelengths to measure real-time wavelengths of the light outputted from the wavelength tunable laser, and for defining one of the reference wavelengths as an absolute reference wavelength; a fiber Bragg grating array for receiving the other of lights split by the first coupler and for reflecting the lights by each of wavelengths of the grating therein; a fiber grating wavelength sensing unit for measuring times when each of lights reflected from the fiber Bragg grating array is detected; a signal processing unit for receiving times of the reference wavelengths generated from the reference wavelength generating unit and times when lights are detected from the fiber grating wavelength sensing unit, for calculating wavelengths in each time period of light outputted from the

wavelength tunable laser, and for calculating wavelengths of the lights detected from the fiber grating wavelength sensing unit.

[Abstract, Fig. 1, 4-10, Col. 1, lines 34-60, Col. 2, lines 6-25, 28-38, 50-55, Col. 4, lines 37-67, Col. 5, lines 1-20.]

However, Kringlebotn does not specifically disclose a device comprising:

1b) a laser wavelength control feedback unit for applying AC voltage to the wavelength tunable filter for output wavelength of the wavelength tunable, laser to be periodically changed, and for receiving data of the wavelengths in each time period of the wavelength tunable filter from the signal processing unit and for applying DC voltage to the wavelength tunable filter in order that the wavelengths in each time period of the wavelength tunable filter are regularly repeated.

Yun discloses this limitation as a means of making a wavelength swept fiber laser. [Yun at pg. 843-844, Fig. 1.]

Since Yun and Kringlebotn are both from the same field of endeavor, the wavelength control of Yun would have been recognized as being in the pertinent art of Kringlebotn.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to combine the wavelength control of Yun with the optical measurement device of Kringlebotn in order to control the output of the F-P tunable filter.

1.3 **Claim 2-12 are rejected** under 35 U.S.C. 103(a) as being unpatentable over US-6097487 to Kringlebotn et al. in view of Non Patent Literature publication titled "Interrogation of Fiber Grating Sensor arrays with a Wavelength-Swept Fiber Laser" by Yun et al., herein after Yun. The combination of Yun and Kringlebotn teach or discloses all of the limitations of the base claim upon which claims 2-12 depend.

Regarding claim 2, Kringlebotn does not specifically disclose an optical wavelength measurement device comprising/wherein:

2) a laser diode for providing pumping lights; a wavelength-division multiplexer for injecting the light outputted from the laser diode to a gain

medium; a wavelength tunable filter controlled by the AC voltage fro periodically scanning or tuning the laser wavelength.

Yun discloses this limitation as a means of making a wavelength swept fiber laser. [Yun at pg. 843-844, Fig. 1.]

Since Yun and Kringlebotn are both from the same field of endeavor, the wavelength swept fiber laser of Yun would have been recognized as being in the pertinent art of Kringlebotn.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to combine the wavelength swept fiber laser of Yun with the optical measurement device of Kringlebotn in order to detect small Bragg wavelength shifts.

Regarding Claim 3, Kringlebotn does not specifically disclose an optical wavelength measurement device comprising/wherein:

3) the output of the wavelength-tunable laser is mode locked by tuning the magnitude and frequency of the AC voltage applied to the wavelength tunable filter.

Yun discloses this limitation as a means of making a wavelength swept fiber laser. [Yun at pg. 843-844, Fig. 1.]

Since Yun and Kringlebotn are both from the same field of endeavor, the wavelength swept fiber laser of Yun would have been recognized as being in the pertinent art of Kringlebotn.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to combine the mode locked wavelength swept fiber laser of Yun with the optical measurement device of Kringlebotn in order to detect small Bragg wavelength shifts.

Regarding Claim 4, Kringlebotn discloses an optical wavelength measurement device comprising/wherein:

4) a Fabry Perot filter, a reference fiber grating and a photodetector; the reference wavelength generating unit characterized in that reflective wavelength of the reference fiber grating is matched with one of wavelengths transmitted through the Fabry-Perot filter thereby corresponding peak is vanished, and the following peak next to the vanished peak is used as an

absolute reference wavelength. [Abstract, Fig. 1, 4-10, Col. 1, lines 34-60, Col. 2, lines 6-25, 28-38, 50-55, Col. 4, lines 37-67, Col. 5, lines 1-20.]

Regarding claim 5-7, Kringlebotn does not specifically disclose:

5) the reference fiber grating is temperature stabilization packaged and line width of the reflected wavelength is widely and flatly processed.

6) the etalon gap of the Fabry Perot filter consists of vacuum or air.

7) the Fabry Perot filter is maintained at a predetermined temperature.

However, it is well known in the art of optical science and design that Fabry Perot filters need to be maintained at precise and controlled temperatures to maintain a known output and calibration. It is also widely known that they can be thermally tuned. Further, air or vacuums is the preferred medium for these types of etalon assemblies.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have selected a temperature stabilized Fabry Perot etalon and temperature at which to operate it, as well as selecting air or vacuum to be the desired medium in order to provide a known and calibrated reference output from the filter under given environmental conditions.

Regarding claim 8, Kringlebotn discloses an optical wavelength measurement device comprising/wherein:

8) the first coupler; a plurality of the fiber Bragg grating arrays; and a plurality of the fiber grating wavelength sensing unit corresponding one by one to the fiber Bragg grating array are optically connected by a multi channel splitter. [Abstract, Fig. 1, 4-10, Col. 1, lines 34-60, Col. 2, lines 6-25, 28-38, 50-55, Col. 4, lines 37-67, Col. 5, lines 1-20.]

Regarding claim 12, Kringlebotn does not specifically disclose an optical wavelength measurement device comprising/wherein:

12) the DC voltage is applied in order to constantly maintain time when the absolute reference wavelength is located.

However, this is a testing methodology that would have been obvious to one of ordinary skill in the art of spectrum analysis. Therefore, it would have been obvious

to one of ordinary skill in the art at the time of invention to use a DC bias voltage to set the reference level at which the reference wavelength is located.

1.4 **Claims 9-11 are rejected** under 35 U.S.C. 103(a) as being unpatentable over US-6097487 to Kringlebotn et al. in view of Non Patent Literature publication titled "Interrogation of Fiber Grating Sensor arrays with a Wavelength-Swept Fiber Laser" by Yun et al., herein after Yun, and in further view of US-6788418 to Kringlebotn and in further view of US-2006/0126067 to Sirat. The combination of Yun and Kringlebotn teach or discloses all of the limitations of the base claim upon which claims 9-11 depend.

Regarding claim 9-11, Kringlebotn does not specifically disclose an optical wavelength measurement device comprising/wherein:

9) depolarizer is further installed at an output end of the wavelength tunable laser.

10) the depolarizer comprises two pieces of polarization-maintaining optical fiber having a length ratio of 1:2 and spliced at the angle of about 45 degrees between them.

11) wavelength tunable laser further, comprises a polarization scrambler at output end thereof.

Kringlebotn discloses a method of measuring orthogonally polarized Bragg wavelengths as a means to eliminate errors in sensor measurements caused by undesired grating birefringence including placing a polarizer at the output of the tunable FP etalon. [Abstract, Fig. 1b,Col. 3, lines 18-45, claims 5, 7, 9.]

Sirat discloses a crystal grating structure that can be used as a fiber Bragg grating sensor and which has depolarizer placed before a polarizer in one configuration. [Fig. 3, #25, paragraph 198, 321-322.]

Further, length ratios and splice angles are quantities dependant on design choice and as such would have been obvious to one of ordinary skill in the art at the time of invention.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to control the polarization state of the light in the fiber Bragg grating

sensor as a means to eliminate errors due to undesired grating birefringence, using techniques similar to those disclosed in Kringlebotn and Sirat.

Conclusion

2.1 Any inquiry concerning this communication or earlier communications from the examiner should be directed to Guy G. Anderson whose telephone number is 571.272.8045. The examiner can normally be reached on Tuesday-Saturday 0900-2200.

2.2 If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank Font can be reached on 571.272.2415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

2.3 Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

2.4 Date and signature of assistant examiner.

April 18, 2007

Frank G. Font
Supervisory Patent Examiner
Technology Center 2800